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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
HANDAL, KAITY V	
ART UNIT	PAPER NUMBER
1764	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/21/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/634,371	SHIMIZU ET AL.	
	Examiner	Art Unit	
	Kaity Handal	1764	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 December 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) _____ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/21/2006 has been entered.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-4 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ovshinsky et al. (US 2002/0029820 A1) in view of Iijima et al. (US 6,649,291 B1) and in view of LaPierre et al. (US 6,348,278).

With respect to claims 1 and 11, Ovshinsky teaches a hydrogen supply system (fig. 2), comprising: a hydrogen supply station/(hydrogen storage bed (51) and meter (43)); and a hydrogen production system (fig. 4, 32) (page 5, paragraph [0056] and [0057], lines 1-5); wherein the hydrogen supply system (fig. 2) supplies hydrogen

produced by the hydrogen production system (32) to the hydrogen supply station/(hydrogen storage bed (51) and meter (43)).

Ovshinsky fails to teach wherein the hydrogen production system (32) has a membrane reformer capable of reforming fuel and separating hydrogen from reformed fuel. Iijima teaches a membrane reformer (fig. 2, 2) having a material tank/fuel tank (fig. 1,1) and is capable of reforming fuel and separating hydrogen from reformed fuel in his hydrogen production apparatus (col. 3, lines 37-40) in order to keep the reaction temperature in fuel reforming low (col. 3, lines 30-36).

It would have been obvious to one having an ordinary skill in the art at the time the invention was made to include a membrane reformer capable of reforming fuel and separating hydrogen from reformed fuel in Ovshinsky's hydrogen supply system instead of having separate units for hydrogen production and for hydrogen purification, as taught by Iijima, in order to keep the reaction temperature in fuel reforming low.

Ovshinsky fails to teach wherein the hydrogen production system is mobile. The fact that the hydrogen production system is mobile/portable or movable is not sufficient by itself to patentable distinguish over an otherwise old device unless there are new or unexpected results. *In re Lindberg,* 194 F.2d 732, 93 USPQ 23 (CCPA 1952). MPEP 2144.04 V A.

Ovshinsky as modified by Iijima discloses wherein the membrane reformer (fig 2, 2) separates hydrogen from reformed fuel to thereby produce a hydrogen stream and an off gas stream, wherein the off gas stream is recycled or discharged (col. 3,

lines 42-49). Ovshinsky as modified, however, fails to show wherein said off gas stream is used as a heat source for the membrane reformer. LaPierre teaches a hydrogen supply apparatus comprising a fuel reformer (fig. 1, 12), a hydrogen separating membrane (14) producing a hydrogen stream (40) and an off gas stream (42 & 48), wherein the off gas stream (48) is used as a heat source for the membrane reformer in order to form a combusted gas stream (100) and to supply heat to the reforming reaction (col. 10, lines 26-43).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the membrane reformer in separate hydrogen from reformed fuel to thereby produce a hydrogen stream and an off gas stream, wherein the off gas stream is used as a heat source for the membrane reformer in Ovshinsky's apparatus as modified by Iijima, as taught by LaPierre, in order to form a combusted gas stream and to supply heat to the reforming reaction.

With respect to claims 2 and 3, Ovshinsky teaches wherein the hydrogen supply station is a hydrogen supply station/(hydrogen storage bed (51) and meter (43)) for a fuel cell powered automobile (page 1, paragraph [0002]).

With respect to claim 4, Ijima further teaches wherein the membrane reformer comprises a hydrogen separation membrane that is capable of generating hydrogen having a purity as high as 99.999% pure (col. 4, lines 7-14).

3. Claims 5-6 and 10 and 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ovshinsky et al. (US 2002/0029820 A1) in view of Iijima et al. (US

6,649,291 B1) and in view of LaPierre et al. (US 6,348,278), as applied to claim 1 above, and further in view of Singh et al. (US 5,686,196).

With respect to claim 5, modified Ovshinsky discloses all claim limitations as set forth above including having a hydrogen production system (32) which employs reforming (page 5, paragraph [0056] and [0057], lines 1-5), but Ovshinsky does not show the specific components involved in reforming. Singh teaches a hydrogen production system comprising an evaporator (illustrated in figure) to provide water vapor in order to prevent carbon formation during the reformation process (col. 3, lines 36-40).

It would have been obvious to one having an ordinary skill in the art at the time the invention was made to include a reformer having an evaporator in Ovshinsky's modified apparatus, as taught by Singh, in order to prevent carbon formation during the reformation process.

With respect to claim 6, Singh further teaches wherein the mobile hydrogen production system comprises a desulfurizer/hydrodesulfurizer (illustrated in figure).

With respect to claim 10, Singh further teaches wherein the mobile hydrogen production system is configured to produce hydrogen by being supplied with two or more kinds of material/(diesel fuel and evaporated water) (as illustrated in figure).

With respect to claim 12, Singh further teaches wherein the mobile hydrogen production system comprises a hydrogen tank/storage (as illustrated in figure).

With respect to claim 13, Ovshinsky further teaches wherein system comprises hydrogen supply stations at two or more locations, and wherein the mobile hydrogen production system moves to the hydrogen supply stations (fig. 4, 36).

With respect to claim 14, Singh further teaches wherein the mobile hydrogen production system comprises a driving/water pump mechanism using a fuel cell (as illustrated in figure), and a material tank/condenser for supplying material/water to be converted to hydrogen wherein the produced hydrogen is utilized for the running of the mobile hydrogen production system itself (as illustrated in the figure).

4. Claims 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ovshinsky et al. (US 2002/0029820 A1) in view of Iijima et al. (US 6,649,291 B1) and in view of LaPierre et al. (US 6,348,278), as applied to claim 1 above, and further in view of Okada et al (US 5,124,140).

With respect to claim 7, modified Ovshinsky discloses all claim limitations as set forth above but fails to show wherein the hydrogen production system comprises a prereformer for decomposing: higher hydrocarbon into lower hydrocarbon. Okada teaches steam reforming of hydrocarbons wherein a prereformer is upstream a steam reformer (fig. 1) in order to decompose higher hydrocarbon (col. 2, lines 21-26).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include a prereformer in the hydrogen production system of

Ovshinsky as modified, as taught by Okada, in order to decompose higher hydrocarbon.

Regarding limitations recited in claim 8 which are directed to a manner of operating disclosed device, neither the manner of operating a disclosed device nor material or article worked upon further limit an apparatus claim. Said limitations do not differentiate apparatus claims from prior art. See MPEP § 2114 and 2115. Further, process limitations do not have patentable weight in an apparatus claim. See Ex parte Thibault, 164 USPQ 666, 667 (Bd. App. 1969) that states "Expressions relating the apparatus to contents thereof and to an intended operation are of no significance in determining patentability of the apparatus claim."

5. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ovshinsky et al. (US 2002/0029820 A1) in view of Iijima et al. (US 6,649,291 B1) and in view of LaPierre et al. (US 6,348,278), as applied to claim 1 above, and further in view of Iio (US 6,908,700 B2).

With respect to claim 9, modified Ovshinsky discloses all claim limitations as set forth above but fails to show wherein the hydrogen production system comprises a compressor unit for compressing hydrogen. Iio teaches a fuel cell system comprising a reformer (fig. 4, 3), a compressor (17) and a hydrogen storage device (14) wherein said compressor compresses hydrogen in order to send it to the hydrogen storage device (14) (col. 4, lines 61-63).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include a hydrogen compressor in the modified hydrogen production system of Ovshinsky, as taught by Iio, in order to compress hydrogen and send it to the hydrogen storage device.

6. Claims 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ovshinsky et al. (US 2002/0029820 A1) in view of Iijima et al. (US 6,649,291 B1) and in view of LaPierre et al. (US 6,348,278), as applied to claims 1 and 4 above, and further in view of Vidalin (US 2002/0085963 A1).

With respect to claims 15-17, Ovshinsky as modified discloses all claim limitations as set forth above but fails to show wherein the hydrogen production system comprises a CO_2 recovery unit and an absorbent regeneration/stripper base for regenerating used absorbent and recovering CO_2 and wherein the regenerated absorbent is utilized to absorb CO_2 in the hydrogen production system. Vidalin teaches a steam reforming system comprising a CO_2 recovery unit and an absorbent regeneration/stripper base in order to recover carbon dioxide (page 5, paragraph [0034]).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include a CO_2 recovery unit and an absorbent regeneration/stripper base in the modified hydrogen production system of Ovshinsky, as taught by Vidalin, in order to recover carbon dioxide.

7. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ovshinsky et al. (US 2002/0029820 A1) in view of Iijima et al. (US 6,649,291 B1), in view of Iio (US 6,908,700 B2), and Singh et al. (US 5,686,196), and Vidalin (US 2002/0085963 A1) and in view of LaPierre et al. (US 6,348,278).

With respect to claim 18, Ovshinsky teaches a hydrogen production system (32) which employs reforming (page 5, paragraph [0056] and [0057], lines 1-5), Ovshinsky further teaches wherein the hydrogen production system comprises reformer or and a hydrogen separation unit using a hydrogen separation membrane/filter (page 6, paragraph [0069]). Ovshinsky does not show the specific components involved in reforming. Iio further teaches a fuel cell reformer system comprising a reformer (fig. 4, 3), a compressor (17) and a hydrogen storage device (14) wherein said compressor compresses hydrogen in order to send it to the hydrogen storage device (14) (col. 4, lines 61-63).

Ovshinsky fails to teach wherein the hydrogen production system (32) has a membrane reformer capable of reforming fuel and separating hydrogen from reformed fuel. Iijima teaches a membrane reformer (fig. 2, 2) having a material tank/fuel tank (fig. 1,1) and is capable of reforming fuel and separating hydrogen from reformed fuel in his hydrogen production apparatus (col. 3, lines 37-40) in order to keep the reaction temperature in fuel reforming low (col. 3, lines 30-36).

It would have been obvious to one having an ordinary skill in the art at the time the invention was made to include a membrane reformer capable of reforming fuel and separating hydrogen from reformed fuel in Ovshinsky's hydrogen supply system

instead of having separate units for hydrogen production and for hydrogen purification, as taught by Iijima, in order to keep the reaction temperature in fuel reforming low.

Ovshinsky as modified by Iijima discloses wherein the membrane reformer (fig 2, 2) separates hydrogen from reformed fuel to thereby produce a hydrogen stream and an off gas stream, wherein the off gas stream is recycled or discharged (col. 3, lines 42-49). Ovshinsky as modified, however, fails to show wherein said off gas stream is used as a heat source for the membrane reformer. LaPierre teaches a hydrogen supply apparatus comprising a fuel reformer (fig. 1, 12), a hydrogen separating membrane (14) producing a hydrogen stream (40) and an off gas stream (42 & 48), wherein the off gas stream (48) is used as a heat source for the membrane reformer in order to form a combusted gas stream (100) and to supply heat to the reforming reaction (col. 10, lines 26-43).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the membrane reformer in separate hydrogen from reformed fuel to thereby produce a hydrogen stream and an off gas stream, wherein the off gas stream is used as a heat source for the membrane reformer in Ovshinsky's apparatus as modified by Iijima, as taught by LaPierre, in order to form a combusted gas stream and to supply heat to the reforming reaction.

Ovshinsky fails to show the specific components involved in reforming such as having an evaporator. Singh teaches a hydrogen production system comprising an

boiler/evaporator (illustrated in figure) to provide water vapor in order to prevent carbon formation during the reformation process (col. 3, lines 36-40).

It would have been obvious to one having an ordinary skill in the art at the time the invention was made to include a reformer having an evaporator in Ovshinsky's apparatus, as taught by Singh, in order to prevent carbon formation during the reformation process.

Singh further teaches wherein the hydrogen production system comprises a hydrogen tank/storage and a material tank/condenser (illustrated in figure).

Ovshinsky fails to show a steam reforming system comprising a CO_2 solvent tank. Vidalin teaches a steam reforming system comprising a CO_2 solvent tank/CO_2 recovery unit and an absorbent regeneration/stripper base in order to recover carbon dioxide (page 5, paragraph [0034]).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include a CO_2 recovery unit and an absorbent regeneration/stripper base in the hydrogen production system of Ovshinsky, as taught by Vidalin, in order to recover carbon dioxide.

Ovshinsky fails to teach wherein the hydrogen production system is mobile. The fact that the hydrogen production system is mobile/portable or movable is not sufficient by itself to patentable distinguish over an otherwise old device unless there are new or unexpected results. *In re Lindberg,* 194 F.2d 732, 93 USPQ 23 (CCPA 1952). MPEP 2144.04 V A.

8. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ovshinsky et al. (US 2002/0029820 A1) in view of Iijima et al. (US 6,649,291 B1), as applied to claim 1 above, and further in view of Iio (US 6,908,700 B2), and Singh et al. (US 5,686,196), and Vidalin (US 2002/0085963 A1).

With respect to claim 19, Ovshinsky as modified teaches a hydrogen production system (32) which employs reforming (page 5, paragraph [0056] and [0057], lines 1-5), Ovshinsky as modified further teaches wherein the hydrogen production system comprises membrane reformer. Ovshinsky as modified does not show the specific components involved in reforming. Iio further teaches a fuel cell reformer system comprising a reformer (fig. 4, 3), a compressor (17) and a hydrogen storage device (14) wherein said compressor compresses hydrogen in order to send it to the hydrogen storage device (14) (col. 4, lines 61-63).

Ovshinsky as modified fails to show the specific components involved in reforming such as having an evaporator. Singh teaches a hydrogen production system comprising an boiler/evaporator (illustrated in figure) to provide water vapor in order to prevent carbon formation during the reformation process (col. 3, lines 36-40).

It would have been obvious to one having an ordinary skill in the art at the time the invention was made to include a reformer having an evaporator in Ovshinsky's modified apparatus, as taught by Singh, in order to prevent carbon formation during the reformation process.

Singh further teaches wherein the hydrogen production system comprises a hydrogen tank/storage and a material tank/condenser (illustrated in figure).

Ovshinsky as modified fails to show a steam reforming system comprising a CO_2 solvent tank. Vidalin teaches a steam reforming system comprising a CO_2 solvent tank/CO_2 recovery unit and an absorbent regeneration/stripper base in order to recover carbon dioxide (page 5, paragraph [0034]).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include a CO_2 recovery unit and an absorbent regeneration/stripper base in the modified hydrogen production system of Ovshinsky, as taught by Vidalin, in order to recover carbon dioxide.

Ovshinsky as modified fails to teach wherein the hydrogen production system is mobile. The fact that the hydrogen production system is mobile/portable or movable is not sufficient by itself to patentable distinguish over an otherwise old device unless there are new or unexpected results. *In re Lindberg,* 194 F.2d 732, 93 USPQ 23 (CCPA 1952). MPEP 2144.04 V A.

9. Claims 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sanger et al. (US 6,190,623 B1) in view of Iijima et al. (US 6,649,291 B1), and LaPierre et al. (US 6,348,278), and Wikstrom et al. (US 2006/0090399 A1).

With respect to claims 20-21, Sanger teaches a hydrogen production apparatus comprising: a booster/compressor having an inlet for receiving a gas to be reformed, the booster being configured to compress the gas (col. 20, lines 35-43); a

prereformer (fig. 1, 14) disposed downstream of the booster and configured to receive compressed gas from the booster (col. 20, lines 35-43), and wherein a desulfurizer is disposed between the booster and prereformer (14) (col. 20, lines 35-43), the prereformer (14) including an inlet for receiving steam (8) from a boiler/heat exchanger (20).

Sanger further teaches a fuel reformer (28) down stream of said prereforming zone (14) but fails to teach wherein said reformer (28) comprises a membrane reformer capable of reforming fuel and separating hydrogen from reformed fuel. Iijima teaches a membrane reformer (fig. 2, 2) having a material tank/fuel tank (fig. 1,1) and is capable of reforming fuel and separating hydrogen from reformed fuel in his hydrogen production apparatus (col. 3, lines 37-40) in order to keep the reaction temperature in fuel reforming low (col. 3, lines 30-36).

It would have been obvious to one having an ordinary skill in the art at the time the invention was made to include a membrane reformer capable of reforming fuel and separating hydrogen from reformed fuel in Sanger's hydrogen supply system instead of having separate units for hydrogen production and for hydrogen purification, as taught by Iijima, in order to keep the reaction temperature in fuel reforming low.

Sanger as modified by Iijima discloses wherein the membrane reformer (fig 2, 2) separates hydrogen from reformed fuel to thereby produce a hydrogen stream and an off gas stream, wherein the off gas stream is recycled or discharged (col. 3, lines 42-49). Sanger as modified, however, fails to show wherein said off gas stream is

used as a heat source for the membrane reformer. LaPierre teaches a hydrogen supply apparatus comprising a fuel reformer (fig. 1, 12), a hydrogen separating membrane (14) producing a hydrogen stream (40) and an off gas stream (42 & 48), wherein the off gas stream (48) is used as a heat source for the membrane reformer in order to form a combusted gas stream (100) and to supply heat to the reforming reaction (col. 10, lines 26-43).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the membrane reformer separate hydrogen from reformed fuel to thereby produce a hydrogen stream and an off gas stream, wherein the off gas stream is used as a heat source for the membrane reformer in Sanger's apparatus as modified by Iijima, as taught by LaPierre, in order to form a combusted gas stream and to supply additional heat to the reforming reaction in Sanger's apparatus.

Sanger as modified discloses all claim limitations as set forth above but fails to show wherein the hydrogen production system comprises a heat recovery unit for receiving and cooling the hydrogen gas stream, a compressor disposed downstream of the heat recovery unit for compressing the hydrogen gas stream; and a storage container for receiving and storing the compressed hydrogen gas stream.

Wikstrom teaches a fuel cell refueling system comprising a reformer (fig. 4, 110), a heat recovery unit (302) for receiving and cooling the hydrogen gas stream, a compressor (112) and a hydrogen storage device (114) in order to provide a high efficiency fuel cell refueling station (page 3, paragraph [0036]).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include a heat recovery unit for receiving and cooling the hydrogen gas stream, a compressor disposed downstream of the heat recovery unit and a storage container for receiving and storing the compressed hydrogen gas stream in the modified hydrogen production system of Sanger, as taught by Wikstrom, in order to provide a high efficiency fuel cell refueling station.

Sanger fails to teach wherein the hydrogen production system is mobile. The fact that the hydrogen production system is mobile/portable or movable is not sufficient by itself to patentable distinguish over an otherwise old device unless there are new or unexpected results. *In re Lindberg,* 194 F.2d 732, 93 USPQ 23 (CCPA 1952). MPEP 2144.04 V A.

With respect to claim 20, claim describes operational conditions and does not limit the invented apparatus. While features of an apparatus may be recited either structurally or functionally, claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. *In re Schreiber*, 128 F.3d 1473, 1477-78, 44 USPQZd 1429, 1431-32 (Fed. Cir. 1997), see also *In re Swinehad*, 439 F.2d 210, 212-13, 169 USPQ 226, 228-29 (CCPA 1971); *In re Danly*, 263 F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959). "Apparatus claims cover what a device is, not what a device does." Hewlett-packard Co. v. Bausch & Lomb Inc., 909 F.2d 1464, 1469, 15 USPQ2d 1525, 1528 (Fed. Cir. 1990) (emphasis in original). MPEP 2114.

10. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sanger et al. (US 6,190,623 B1) in view of Iio (US 6,908,700 B2), and Iijima et al. (US 6,649,291 B1), and LaPierre et al. (US 6,348,278), and Wikstrom et al. (US 2006/0090399 A1).

With respect to claim 22, Sanger teaches a hydrogen production apparatus comprising: a booster/compressor having an inlet for receiving a gas to be reformed, the booster being configured to compress the gas (col. 20, lines 35-43); a fuel reformer (28) disposed downstream of the booster.

Sanger fails to teach the specific components involved in reforming. Iio teaches a hydrogen production fuel cell system comprising an evaporator/vaporizer (fig. 4, 6) (illustrated in figure) upstream a reformer (3) in order to vaporize fuel and water (col. 2, lines 7-11).

It would have been obvious to one having an ordinary skill in the art at the time the invention was made to include a reformer having an evaporator in Sanger's apparatus, as taught by Iio, in order vaporize fuel and water.

Sanger fails to teach wherein said reformer (28) comprises a membrane reformer capable of reforming fuel and separating hydrogen from reformed fuel. Iijima teaches a membrane reformer (fig. 2, 2) having a material tank/fuel tank (fig. 1,1) and is capable of reforming fuel and separating hydrogen from reformed fuel in his hydrogen production apparatus (col. 3, lines 37-40) in order to keep the reaction temperature in fuel reforming low (col. 3, lines 30-36).

It would have been obvious to one having an ordinary skill in the art at the time the invention was made to include a membrane reformer capable of reforming fuel and separating hydrogen from reformed fuel in Sanger's hydrogen supply system instead of having separate units for hydrogen production and for hydrogen purification, as taught by Iijima, in order to keep the reaction temperature in fuel reforming low.

Sanger as modified by Iijima discloses wherein the membrane reformer (fig 2, 2) separates hydrogen from reformed fuel to thereby produce a hydrogen stream and an off gas stream, wherein the off gas stream is recycled or discharged (col. 3, lines 42-49). Sanger as modified, however, fails to show wherein said off gas stream is used as a heat source for the membrane reformer. LaPierre teaches a hydrogen supply apparatus comprising a fuel reformer (fig. 1, 12), a hydrogen separating membrane (14) producing a hydrogen stream (40) and an off gas stream (42 & 48), wherein the off gas stream (48) is used as a heat source for the membrane reformer in order to form a combusted gas stream (100) and to supply heat to the reforming reaction (col. 10, lines 26-43).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the membrane reformer separate hydrogen from reformed fuel to thereby produce a hydrogen stream and an off gas stream, wherein the off gas stream is used as a heat source for the membrane reformer in Sanger's apparatus as modified by Iijima, as taught by LaPierre, in order to form a combusted

gas stream and to supply additional heat to the reforming reaction in Sanger's apparatus.

Sanger as modified discloses all claim limitations as set forth above but fails to show wherein the hydrogen production system comprises a heat recovery unit for receiving and cooling the hydrogen gas stream, a compressor disposed downstream of the heat recovery unit for compressing the hydrogen gas stream; and a storage container for receiving and storing the compressed hydrogen gas stream.

Wikstrom teaches a fuel cell refueling system comprising a reformer (fig. 4, 110), a heat recovery unit (302) for receiving and cooling the hydrogen gas stream, a compressor (112) and a hydrogen storage device (114) in order to provide a high efficiency fuel cell refueling station (page 3, paragraph [0036]).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include a heat recovery unit for receiving and cooling the hydrogen gas stream, a compressor disposed downstream of the heat recovery unit and a storage container for receiving and storing the compressed hydrogen gas stream in the modified hydrogen production system of Sanger, as taught by Wikstrom, in order to provide a high efficiency fuel cell refueling station.

Sanger fails to teach wherein the hydrogen production system is mobile. The fact that the hydrogen production system is mobile/portable or movable is not sufficient by itself to patentable distinguish over an otherwise old device unless there are new or unexpected results. *In re Lindberg,* 194 F.2d 732, 93 USPQ 23 (CCPA 1952). MPEP 2144.04 V A.

With respect to claim 22, claim describes operational conditions and does not limit the invented apparatus. While features of an apparatus may be recited either structurally or functionally, claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. *In re Schreiber*, 128 F.3d 1473, 1477-78, 44 USPQZd 1429, 1431-32 (Fed. Cir. 1997), see also *In re Swinehad*, 439 F.2d 210, 212-13, 169 USPQ 226, 228-29 (CCPA 1971); *In re Danly*, 263 F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959). "Apparatus claims cover what a device is, not what a device does." Hewlett-packard Co. v. Bausch & Lomb Inc., 909 F.2d 1464, 1469, 15 USPQ2d 1525, 1528 (Fed. Cir. 1990) (emphasis in original). MPEP 2114.

Response to Arguments

Applicant's arguments with respect to claims 1-22 have been considered but are moot in view of the new ground(s) of rejection necessitated by amendment.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kaity Handal whose telephone number is (571) 272-8520. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KH

3/9/2007

GLENN A. CALDAROLA
PRIMARY EXAMINER
GROUP 1700